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A NEW APHID FROM MAURITIUS (HEMIPTERA)

By Ryoichi Takahashi.

(*Department of Agriculture, Research Institute, Formosa.*)

Communicated by Sir Guy Marshall, C.M.G., F.R.S., F.R.E.S.

Neophyllaphis araucariae sp. n.

Winged viviparous female. Greenish-black in specimens preserved in alcohol. Head smooth, lacking a median suture, with about 8 minute dorsal setae, and a pair of very small, shallow, rounded protuberances on the front, which are smaller than the ocelli and provided with a few small simple setae; venter of head with 3 or 4 pairs of very small setae between the antennae. Eyes large, with distinct ocular tubercles. Front ocellus visible from above, dorsal ocelli a little separated from the eyes. Antennae 5- or 6-segmented; the 2nd segment smaller than the 1st, a little longer than wide; the 3rd rather stout, constricted at the base, with 21 or 22 linear sensoria arranged in a single row along the whole length, which sensoria occupy half the circumference of the segment; the 4th–6th narrowed towards the base, narrower than the 3rd, with transverse rows of minute spinules and a few small setae; the 4th often not defined from the 3rd, without secondary sensoria; the penultimate segment thrice as long as wide, with a small transverse primary sensorium; the last segment much longer than the penultimate; the relative length of segments about as follows: III—65, IV—18, V—25 + 5 in the 5-segmented antennae; III—55, IV—13, V—15, VI—25 + 5 in the 6-segmented antennae. Rostrum reaching the hind coxae, the distal 2 segments short, but much longer than wide, the last segment shorter, obtuse, with 3 pairs of short setae on the distal part. Thorax and abdomen without evident setae; abdomen scarcely sclerotised on the last tergite. Cornicles very short, represented as mere rings. Cauda much longer than wide, distinctly constricted basally, rounded at the apex, a little imbricated, slightly constricted about the middle, with 5 short setae. Anal plate short, converging on the lateral sides, divided, the lobes much wider than long, separated, rounded on the hind margin, with about 8 setae, of which 2 on the hind margin are longer. Gonapophyses 4. Legs moderate in size; trochanters defined from the femora; tibiae nearly as stout as the 3rd antennal segment excluding the sensoria, with some very small simple setae; hind tibiae sometimes with a small oval pore on the basal part; tarsi not or scarcely striate, lacking capitate setae, with 7 simple setae on the basal segment, of which 2 lateral ones on the apex are longer; hind tarsi shorter than the last antennal segment. Wing-veins rather stout; the 2nd branch of media rather short; radial sector a little curved; stigma wide, not elongated; hind-wings with 2 diverging veins and 2 hooklets. Body—1·43 mm. long; head—0·175 mm. long, 0·323 mm. wide (including the eyes); antenna—0·59 mm. long, the 3rd segment—0·028 mm. wide

(excluding the sensoria); cornicle—0·03 mm. in diameter (excluding the margin); cauda —0·111 mm. long; anal plate—0·16 mm. wide at the base; hind tibia—0·415 mm. long, 0·028 mm. wide at the middle; hind tarsus—0·11 mm. long.

Wingless viviparous female. Greenish-black in specimens preserved in alcohol. Body oval, soft, very slightly sclerotised on the head and the 8th abdominal tergite. Head somewhat concave at the middle of front, with a faint median line. Eyes of 3 facets.

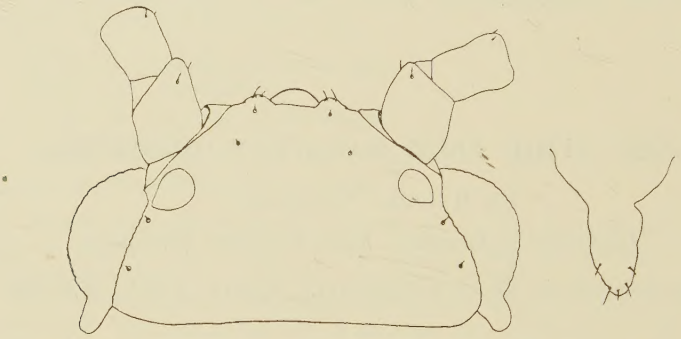


Fig. 1.—*Neophyllaphis araucariae* sp. n., winged viviparous ♀. Head and cauda.

Antennae 5-segmented; the 3rd segment not constricted basally, narrower than the tibiae, without sensoria; the relative length of segments about as follows: III—30, IV—11, V—20 + 5. Rostrum reaching a little beyond the middle coxae. Hind tibiae with no pore on the basal part. Body—1·25 mm. long; antenna—0·39 mm. long, the 3rd segment—0·019 mm. wide at the middle; cornicle—about 0·028 mm. in diameter; hind tibia—0·28 mm. long, about 0·028 mm. wide at the middle; hind tarsus—0·09 mm. long; anal plate—0·16 mm. wide at the base. Other characters as in the winged form.

Host: *Araucaria cunninghami* (Araucariaceae, Coniferae).

Mauritius: Rose Hill, 2 winged and some wingless forms (April 1936) (*Ray Mamet*).

The genus *Neophyllaphis* Takah. has been represented by a single species, *N. podocarpi* Takah., which is distributed in Australia, New Zealand, China, Formosa and Japan, feeding on *Podocarpus* (Podocarpaceae), a coniferous plant related to the Araucariaceae. The present new species differs from that as follows: Body smaller. Head of the winged form with smaller dorsal setae and shallow protuberances on the front. Head of the wingless form more concave at the middle of the front. Antennae 5- or 6-segmented in the winged form, but 5-segmented in the wingless; the 3rd segment with much fewer sensoria in the winged; the last segment distinctly longer than the penultimate. Cornicles shorter.

I express here my gratitude to Mr. R. Mamet for sending me the specimens. The type specimens are in the Department of Agriculture, Research Institute, Formosa.

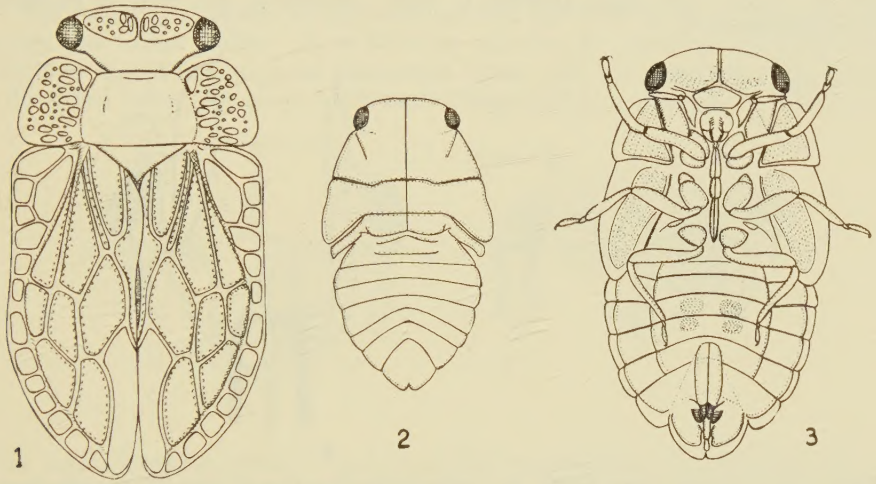
A NEW SPECIES OF PELORIDIIDAE (HEMIPTERA, HOMOPTERA) FROM TASMANIA

By J. W. Evans, M.A., F.R.E.S.

During a few days' visit to National Park, Tasmania, made during December 1936, a search was made for *Hemiodoecus leai* China, since it was known that this species of Peloridiidae occurred in the Park. None was found, but twenty-five specimens, comprising adults and nymphs of both sexes of an undescribed species, were collected. This species, which is described below, is dedicated to my wife, as the original discoverer.

Hemiodoecus fidelis sp. n. (figs. 1–3).

Length, 3 mm. General coloration, pale greyish-brown; eyes reddish-brown. Anterior margin of head almost evenly rounded with a very slight medium depression, and with two



Figs. 1–3.—*Hemiodoecus fidelis*, adult insect in dorsal aspect; 2. Nymph, dorsal aspect; 3. Nymph, ventral aspect.

reticulate areolae. Pronotum wide, with the anterior lateral angles of the paranota rounded; paranota with numerous small areolets. Male genitalia (figs. 4, 5), with large bifurcated parameres.

Type, sub-brachypterous ♂. Tasmania: National Park, 3500 ft. (*F. Evans*), in the collection of the Australian Museum, Sydney. Paratypes in the British Museum.

This species may be readily distinguished from others in the same genus by the character of the areolae of the paranota, which are small and numerous. All the other described species have three or four large areolae.

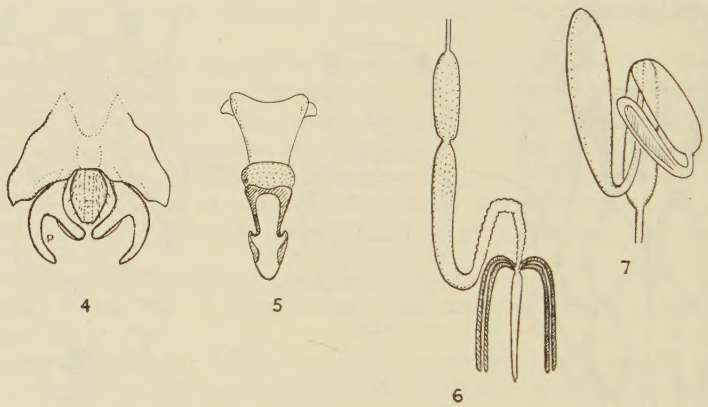
Nymphal instars. Head pale yellowish-brown. Pronotum medially green; paranota pale brownish-yellow. Meso- and metathoracic segments marked with a pattern of green and brown. Wing-cases pale brownish-yellow; abdomen moss-green with a brownish-yellow border.

Nymphs belonging to three different instars were found. In the earliest of these (fig. 2), tergal outgrowths, or paranotal lobes are present on each of the three thoracic segments, whilst in the last instar nymphs (fig. 3), only those on the pro- and mesothorax are evident, those on the prothorax being separated from the body proper by a suture. Snodgrass (1936) suggests that the first step in the evolution of paranotal lobes into organs of flight must have consisted in the acquisition of a line of flexibility in the base of each lobe. The suture referred to above is such a line of flexibility.

Environment.

Because of the supposed association of the Peloridiidae with trees belonging to the genus *Nothofagus*, the search for *Hemiodoecus* was confined to these trees.

In the neighbourhood of Lake Fenton in National Park, *Nothofagus cunninghami* occurs, as a tall upright tree growing in dense rain forest; as a small stunted bush, growing in the open in well-drained soil, and as a low tree from five to fifteen feet high, growing in open country in soil that is probably permanently wet.



Figs. 4–7.—*Hemiodoecus fidelis*, 4. male genitalia, dorsal aspect, p., paramere; 5. Aedeagus; 6. *Hemiodoecus fidelis*, intestine; 7. Testis and accessory gland.

Although branches were beaten and moss growing on the trees examined, in the case of trees growing in each of these three environments, the specimens taken were all found in a restricted area, on dead beech twigs lying on the ground, and in damp moss growing on the ground, immediately beneath the low-spreading branches of beech trees growing in open country, in damp soil close to the margin of the Lake.

It is probable that there is no direct association between trees of the genus *Nothofagus* and the Peloridiidae, the apparent association being explained by the fact that the distribution of both is identical. If this is so, then these insects should occur in moss beneath other trees in the same environment. The principal trees and shrubs growing alongside the beech trees where *Hemiodoecus fidelis* was found are the deciduous beech, *Nothofagus gunnii*; the Waratah, *Telopea truncata* and *Richea pandanifolia*. As evidence of the antiquity of the flora of the area, it may be mentioned that *Isoetes lacustris* grows in Lake Fenton itself.

Habits.

Hemiodoecus fidelis walks with slow awkward movements, and if disturbed will fall on to its back and rest quiescent for a period. It is negatively phototropic, reacting quickly to bright light and evidently requires a high degree of humidity in its environment.

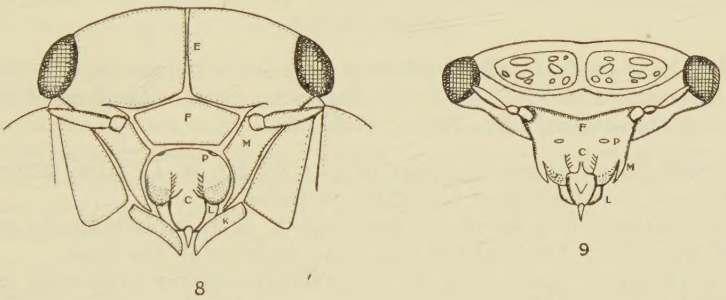
Internal anatomy.

The intestine (fig. 6) is of a simple type; there is no development of a filter chamber, and four Malpighian tubes. The ovaries of the single female dissected contained six well-developed eggs in each ovary, but no trace was found of developing oocytes.

The male reproductive organs (fig. 7) consist of a long sac-like testis and a short vas deferens. The vesicula seminalis and accessory gland open into a wide duct, which narrows posteriorly before joining the ejaculatory duct.

External anatomy.

The external anatomy of *Hemiodoecus leai* has been fully investigated by Myers and China (1929). It is doubtful whether *H. fidelis* differs from the genotype except in superficial characters, hence only the structure of the head is discussed below, for which a different interpretation is presented. The head



FIGS. 8–9.—*Hemiodoecus fidelis*, 8. head of nymph in ventral aspect. E., epicranial suture; F., frons; M., maxillary plate; P., frontal pit; C., clypeus; L., lorum; K., kat-episternum; 9. Adult head, ventral aspect. Lettering as in fig. 8.

of the nymph is intimately joined to the prothorax, and dorsally no suture is apparent between the two. Ventrally (fig. 9) the sutures are well defined and render possible the interpretation of the sclerites of the adult head. Medially between the antennae lies the frons which is bounded by the vertex posteriorly, the maxillary plates laterally and the clypeus anteriorly. The clypeus consists of a wide post-clypeus which medially bears the impression of the dilator muscles of the sucking pump, and a narrow ante-clypeus. The latter is bounded laterally by the lorae. The long narrow plates which overlap the lorae have been shown by Myers and China to be the kat-episterna of the prothorax.

In the adult head (fig. 9), the frons is not defined, being fused with the clypeus on one side and the vertex on the other. The frontal pits, however, serve to define the boundary between the frons and clypeus.

The above interpretation differs from that given by Myers and China for *Hemiodoecus leai* in a few particulars. They considered that the labium was

four-segmented. In *H. fidelis* there are apparently only three segments, the proximal one being attached to the head by a pair of struts. The sclerites designated " maxillary plates " by these authors are here called the lorae, since they bear the attachments of the mandibular stylets, whilst their lorae would appear to correspond to the maxillary plates shown in figs. 8 and 9.

In the head of the nymph, in which the frons and clypeus are quite distinct, raised lobes occur on the sclerite anterior to the frons on either side of the impressions of the muscles of the sucking pump. Myers and China designated these lobes, in the adult head, " frontal lobes "; actually they are part of the clypeus. In conclusion it may be mentioned that these authors were severely handicapped in their study, since only one specimen was available to them.

References.

Myers, J. G., and China, W. E., 1929, The systematic position of the Peloridiidae as elucidated by a further study of the external anatomy of *Hemiodoecus leai* China. *Ann. Mag. nat. Hist.*, (10) **3** : 282–294.

Snodgrass, R. E., 1936, *Principles of Insect Morphology.*

Book Notice.

Peile, H. D., *A guide to collecting butterflies of India : detailing over* 600 *forms in the text.* Pp. xiv + 360, 25 pls. (col.). 8vo. London, John Bale, Sons & Danielsson, Ltd., 1937. £1 5*s*. 0*d*.

This book opens with a two page preface by Mr. N. D. Riley which serves to introduce it to collectors of butterflies in India.

This is followed by a list of contents, which, being alphabetically arranged, is in fact an index to the chapters and main divisions of the book.

The work proper opens with an introductory chapter explaining essentials in suitable language, defining necessary terms used and concluding with a short list of books dealing with Indian butterflies.

This is succeeded by the main part dealing with the insects arranged in systematic order.

Under the name of each insect is given the locality in which it is most likely to be found, a brief description, references to its description and illustration in the literature when available, description of the larva and pupa if these are known and a description of the habits of the various stages of the butterfly.

A notable feature is the collection of local lists added to this book.

NOTES ON CERATOPOGONIDAE (DIPTERA)

By Dr. J. W. S. Macfie, F.R.E.S.

A new species of *Pterobosca* from British Honduras.

A dozen species of Ceratopogonidae found attached to the wings of dragonflies have now been described, nine of them referable to the genus *Pterobosca*, and three to *Forcipomyia* (*Lasiohelea*). Six species have been found in Java, Sumatra, New Guinea, and the Moluccas, namely, *P. aeschnosuga* (de Meij.), *P. adhesipes* Macfie, *P. odonatiphila* Macfie, *P. ariel* Macfie, *L.* (?) *samoensis* Edw., and *L. pennambula* Macfie; two in China, *P. latipes* Macfie, and *P. fidens* Macfie; one in Assam, *P. aerobates* Macfie; one in Liberia, West Africa, *P. mollipes* Macfie; one in England, *P. paludis* Macfie; and one in Peru, *L. intrepida* Macfie. The species described below is the first to be found in central America, and the first species of the genus *Pterobosca* to be recorded from the continent of America.

I have to thank Mrs. Leonora K. Gloyd, of Ann Arbor, Michigan, for the opportunity of examining the specimens which, having observed them in the course of her studies on Odonata, she was so kind as to forward to me for determination.

Pterobosca incubans sp. n.

A small, very dark brown species without claws, resembling *P. mollipes* Macfie, but having only a single spermatheca.

♀. Length of wing, about 0·7 mm.; greatest breadth, about 0·3 mm.

Head almost black. Eyes bare, contiguous above. Proboscis very short. Palpi dark brown, second segment quite small, third slightly inflated, with a small pit; lengths of last three segments about 7, 5, and 6 units * respectively. Antennae very dark brown: segments 3–9 flattened, broader than long, measuring from about 6 by 7 to 4 by 5 units; segments 10–15 more elongate, 10–14 successively a little longer, from about 7 by 5 to 9 by 5 units, the last segment longer, about 17 units (including the stylet), ending in a nipple-like process. The combined lengths of segments 3–9 and 10–15 about 25 and 58 units respectively. *Thorax* almost black; rather sparsely clothed with short, stiff, dark brown hairs. Scutellum and postscutellum almost black, the former bearing a number of bristles and hairs, most of them situated on the middle third. *Wings* unadorned, but radial areas and radial veins infuscated. Venation and distribution of macrotrichia as in *P. mollipes*. Macrotrichia not very abundant. Bare areas along veins distinct. No scales. Costa extending about half length of wing. First radial cell obliterated; second well formed, much longer than broad. Fork of *Cu* at about same level as base of second radial cell. Halteres with dark brown knobs. *Legs* almost uniformly very dark brown. T.R. about 3·3. Fourth tarsal segment not very small, nearly as long as fifth. No claws. Empodium very large. *Abdomen* (including cerci) very dark brown, without scales. Spermatheca single, highly chitinised, oval or pear-shaped, length about 59 μ and greatest breadth about 42 μ; the commencement of the duct chitinised for only a short distance, about 3 μ.

British Honduras: Mt. Pine Ridge, south of Cayo, 7.iii.1931, 2 ♀♀ (*Dr. Adolf Murie*). Found attached to a fore-wing of a male specimen of *Argia ulmeca* Calvert.

This species resembles most closely *P. mollipes* Macfie and *P. adhesipes* Macfie. It may be most readily distinguished from the former by the single spermatheca, and from the latter by the longer fourth tarsal segment.

* The unit used is 3·7 μ.

A species of *Forcipomyia* found feeding on larvae.

Forcipomyia inornatipennis (Aust.).

NYASALAND: Zomba, 2500 ft., iv.1936, 5 ♀♀, "feeding on larvae of *Laphygma exempta* Wlk." (C. Smee).

These insects do not differ from typical West African examples of the species excepting in having somewhat smaller spermathecae. In West African specimens the spermathecae are "oval, often unequal and rather variable in size," may "range in length from 80 μ to 130 μ, and in breadth from 60 μ to 80 μ," and have "practically no part of the duct chitinised." In the five specimens from Zomba they are sub-equal, oval or sub-spherical, about 45–55 μ by 40–45 μ, and have a very short zone of chitinisation at the commencement of the ducts.

It may be noted that a somewhat similar species (with scales, T.R. 0·5) from South America, *F. squamosa* Lutz, has also been found feeding on larvae.

Two Malayan collections of *Culicoides* and *Lasiohelea*.

The two collections were made by Dr. C. H. Williams and Mr. J. J. Buckley. All the specimens are females. Dr. Williams' specimens (122) were taken at Pengkalan Kempas on the banks of a shallow river, and include only two species, *C. orientalis* Macfie (79), and another species of *Culicoides* which is apparently new, and is described here under the name *C. flumineus* sp. n. (43). Mr. Buckley's specimens (118) were all taken at Kuala Lumpur on cattle. They include a variety of *C. anophelis* Edwards described here as *C. anophelis* Edw. var. *flavescens* var. n. (3), *C. daleki* Smith & Swaminath (11), *C. orientalis* Macfie (3), *C. oxystoma* Kieffer (10), *C. peregrinus* Kieffer (6), *C. pungens* de Meijere (18), *C. raripalpis* Smith (3), *C. shortti* Smith & Swaminath (20), *C. sumatrae* Macfie (4), and two species of *Culicoides* apparently new and described here as *C. boophagus* sp. n. (3), and *C. buckleyi* sp. n. (14). They include also two species of *Lasiohelea*, the one (7) closely resembling *L. lefanui* (Carter), and the other (16) *L. nigeriae* Ingram & Macfie.

Brief notes on some of these specimens and descriptions of the new species are given below. A key is added which, although only provisional, may be of assistance in the determination of species of *Culicoides* found in Malaya and neighbouring countries.

A key for the determination of species of Culicoides *found in Malaya and neighbouring countries.*

1. Wings unadorned *albipennis* Smith & Swaminath (? syn. of *raripalpis* Smith).
   Wings adorned with pale spots, or with dark areas on a pale ground . . 2.
2. Wings without macrotrichia . . . . . 3.
   Wings with macrotrichia . . . . . 4.
3. Thorax shining blackish. Costa very long, ending just beyond pale spot. *R*2 wanting. Branches of *Cu* not bordered by pale zones *nitens* Edwards.*
   Thorax very dark brown, not shining. Costa not exceptionally long, ending in pale spot. Two radial cells. Branches of *Cu* bordered by pale zones on both sides for greater part of lengths . . *boophagus* sp. n.
4. Second radial cell entirely dark, or with only extreme tip of *R*4 + 5 in pale area . . . . . 5.
   Second radial cell at least in part enveloped by pale spot . . . . . 12.
5. Fourth tarsal segments cordiform . . . . . *cordiger* Macfie.
   Fourth tarsal segments not cordiform . . . . . 6.
6. With two pale spots immediately posterior to *R*4 + 5 *guttifer* de Meijere.

* Vein *R*2 wanting; a single radial cell.

No pale spot in this situation, or only a general pallor . . . . . 7.
7. With pale spot immediately anterior to fork of *Cu* . . . . . 8.
No pale spot in this situation . . . . . 9.
8. Second pale spot in cell *R*5 situated some distance from tip of wing *oxystoma* Kieffer.
This pale spot situated in angle between *M*1 and wing margin, close to tip of wing . *similis* Carter, Ingram, & Macfie (recorded by Smith & Swam.).
9. Three pale spots in cell *R*5 . . . . . *shortti* Smith & Swaminath.
Only one or two pale spots in cell *R*5 . . . . . 10.
10. Macrotrichia very scanty, at tip of wing only *pungens* de Meij. (= *actoni* Smith).
Macrotrichia numerous, extending almost to base . . . . . 11.
11. Pale spot which envelops cross-vein reaching anterior margin of wing. Pale spots on posterior part of wing distinct. A single, large, sack-like spermatheca . . . . . *daleki* Smith & Swaminath.
Pale spot which envelops cross-vein not reaching anterior margin of wing. Pale spots on posterior part of wing indistinct. Two obovate spermathecae of moderate size . . . . . *flumineus* sp. n.
12. Only one distinct pale spot in cell *R*5, namely that covering part of second radial cell. Second radial cell large, triangular . . . . . 13.
Two distinct pale spots in cell *R*5 . . . . . 14.
13. Spermathecae sausage shaped *fulvithorax* Austen (rec. by Smith & Swam.).
Spermathecae pyriform, with part of duct chitinised *anophelis* Edwards, and *anophelis* Edw. var. *flavescens* var. n.
Spermathecae sub-spherical, not chitinised at base . . . *raripalpis* Smith.
14. Second pale spot in cell *R*5 large, reaching to tip of wing . *orientalis* Macfie.
This spot not so large, or not reaching to tip of wing . . . . . 15.
15. Pale spot in distal part of cell *M*1 reaching margin of wing. Second radial cell entirely pale. Macrotrichia restricted to less than a dozen at extreme tip of wing . . . . . *gymnopterus* Edwards.*
This pale spot not reaching margin of wing, but set back from it a little . 16.
16. Angle formed by branches of *Cu* occupied by a pale area . . . . . 17.
This angle not occupied by a pale area . . . . . 18.
17. Pale areas present around terminations of *M*1, *M*2, and *Cu*1 *peregrinus* Kieffer var. *assamensis* Smith & Swaminath.
Without such pale areas *peregrinus* Kieffer (syns. *esmoneti* Salm., *judicandus* Bezzi, *philippinensis* Kieffer).
18. Costa ending in the pale spot which envelops part at least of second radial cell . . . . . 19.
Costa extending across this pale spot and ending just in the dark area beyond it. . . . . 23.
19. Pale spot between branches of *Cu* large, and abuts on *Cu*1 . . . . . 20.
This pale spot smaller, not reaching either *Cu*1 or *Cu*2 . . *sumatrae* Macfie.
20. Pale spot in middle of cell *R*5 reaching anterior border of wing. Whole or almost whole of second radial cell covered by pale spot . . . . 21.
Pale spot in middle of cell *R*5 not reaching anterior border of wing . . 22.
21. Macrotrichia very scanty, at tip of wing only . . . . . *jacobsoni* Macfie.
Macrotrichia numerous, covering most of wing distal to level of end of costa. Second radial cell larger . . . . . *klossi* Edwards.
22. Length of wing, 1·8–1·9 mm. Pale spot situated immediately anterior to fork of *Cu* . . . . . *maculipennis* Macfie.*
Length of wing, about 0·9 mm. No pale spot immediately anterior to fork of *Cu* . . . . . *buckleyi* sp. n.
23. Length of wing about 1·9 mm. Pale spot in middle of cell *R*5 reaching anterior border of wing. . . . . *gentilis* Macfie.*
Length of wing about 1·3 mm. Pale spot in middle of cell *R*5 not reaching anterior border of wing . . . . . *gemellus* Macfie.*

Culicoides anophelis Edw. **flavescens** var. n.

Malaya: Kuala Lumpur, 1936, 3 ♀♀, "on cattle" (*J. J. Buckley*).

At least two species have been confused under the name *Culicoides anophelis*, the one with the spermathecae pyriform, the other with them oval and widely open at the base. Both appear to be variable in colour and adornment, but both have the large and characteristic second radial cell on the wing, and otherwise resemble each other morphologically excepting in the form of the spermathecae.

Thanks to the courtesy of Dr. F. W. Edwards I have been able to examine the co-types of *Culicoides anophelis*. In them the spermathecae are three, sub-equal, pyriform, the diameters about 40 μ and 37 μ respectively, and the ducts narrow and chitinised for a short distance, about 3–4 μ. They have the scutum yellowish, with a trilobed dark brown area anteriorly and a dark brown patch immediately in front of the scutellum; the scutellum, postscutellum, and abdomen all dark brown or blackish, and the hind legs with the femora dark brown excepting for a pale band a little before the apex, and the tibiae pale brown excepting for a rather indistinct darker brown band about the middle. The male is not known.

Culicoides anophelis is said to be a variable species. Smith and Swaminath (1932) note that "variation in size is well marked in this species and also in the colour of the thorax," and record that they had "found individuals with the scutellum and pro-thorax coloured the same as the meso- and meta-thorax and not showing the dark shoulder spots." The three specimens assigned here to this species differ notably from the co-types, but the spermathecae are similar, only slightly smaller, about 30 μ by 26 μ in the specimen measured. They are much paler in colour, more yellowish; the scutum and scutellum almost uniformly yellowish-brown, the postscutellum brown, only slightly darker than the scutellum, and the abdomen pale brown. The hind legs are much paler, the dark brown areas on the femora being restricted to the base and apex, and the tibiae being entirely pale brown. The adornment of the wings is fainter, the dark brown markings being considerably more restricted. The differences are indeed such that they might be considered specific were it not for the fact that there appear to be no morphological distinctions. They are so notable, however, that the insects should perhaps be regarded as a distinct variety.

Culicoides daleki Smith & Swaminath.

Malaya: Kuala Lumpur, 1936, 11 ♀♀, "on cattle" (*J. J. Buckley*).

These insects are probably *C. daleki*, a species found in Assam and described by Smith and Swaminath (1932), in which the wings bear a similar adornment, and there is only a single, large, sack-like spermatheca. The Malayan specimens appear to be paler in colour than those from Assam, the scutellum, for example, being yellowish-brown rather than "very dark brown with the anterior and lateral margins lighter coloured," and the legs are almost uniformly pale brown. The adornment of the wings, and the distribution of macrotrichia, are similar excepting that the pale spot distal to the end of the costa does not appear to be divided. The spermatheca is single, very large, and rather feebly chitinised. It is apt to be much crumpled, and in both the Malayan specimens examined by me was somewhat folded. So far as it was possible to make out its shape, however, it appeared to be wider than the one figured by Smith and Swaminath, more sack-like, and rather smaller, about 90 μ by 60 μ.

Culicoides orientalis Macfie.

MALAYA: Kuala Lumpur, 1935, 3 ♀♀, " on cattle " (*J. J. Buckley*). Pengkalan Kempas, 1936, 79 ♀♀, " Banks of shallow river " (*C. H. Williams* and *A. K. Ratnam*).

The long series from Pengkalan Kempas shows a considerable range of variation in colour. In these specimens the wing adornment is less distinct, the macrotrichia rather more scanty, and the antennae somewhat longer. They may be a separate species. There are no males in the collection for a comparison of genital characters.

Culicoides pungens de Meij.

MALAYA: Kuala Lumpur, 1935 and 1936, 18 ♀♀, " on cattle " (*J. J. Buckley*).

This species, originally described by de Meijere (1909) from specimens collected in Sumatra, has apparently a wide range of distribution. *C. actoni* Smith (a paratype of which I have examined) is, I think, a synonym. The insect resembles closely the African *C. grahami* Aust., and may indeed be the same species. The hypopygium of *C. pungens* has not hitherto been described.

Culicoides raripalpis Smith.

MALAYA: Kuala Lumpur, 1936, 3 ♀♀, " on cattle " (*J. J. Buckley*).

This is the other species which, I think, has sometimes been confused with *Culicoides anophelis* Edw. It resembles *C. anophelis* closely, indeed appears to be indistinguishable from it by external characters, but the spermathecae are quite distinct, and are of an unusual form. They are three, well chitinised, oval or sub-spherical, unequal, the middle one larger than the two lateral ones which are sub-equal, and their bases are not chitinised and lead into wide ducts.

According to Smith's description (1929) the dorsum of the thorax of *C. raripalpis* is dark brown, the scutellum and postscutellum black, and the abdomen black. In the Malayan specimens here referred to this species the scutum is yellowish-brown, the scutellum darker, dark brown in the dry condition but paler brown when mounted, and the postscutellum and abdomen dark brown or blackish. The differences are therefore notable, but *C. raripalpis* may be a variable species like *C. anophelis*, and it may be best, for the present at any rate, to regard the Malayan specimens as a paler variety of the species collected in Assam and described by Smith.

Another species, also from Assam, *Culicoides albipennis* Smith & Swaminath (1932), resembles *C. raripalpis* closely, having similar wing-venation and spermathecae. It differs, however, in having the wings unadorned, the thorax with " ground-colour silvery grey—with rows of dark punctuations from each of which a hair arises," and the scutellum yellow-brown. The abdomen is described as dark brown, but the colour of the postscutellum is not mentioned. The name *Culicoides albipennis* is preoccupied, having been used by Kieffer (1901 and 1925) for a European species, but a new name is not proposed because it is possible the species is a variety of *C. raripalpis*. The male is known, and a figure of the hypopygium is given by Smith and Swaminath, and may help in the final elucidation of the difficulties.

Culicoides shortti Smith & Swaminath.

MALAYA: Kuala Lumpur, 1936, 20 ♀♀, " on cattle " (*J. J. Buckley*).

For purposes of comparison with other species the following details may be added to the excellent description given by Smith and Swaminath. Antennal segments forming a nearly continuous series : 4–10 ranging in one specimen from 8 by 6 to 9 by 5 units, 11–14 from 10 by 5 to 12 by 5 units, and 15 about 18 by 5 units. The combined lengths of segments 3–10, 4–10, and 11–15 about 72, 62, and 64 units respectively. Halteres brownish, with whitish knobs. T.R. about 2. Hind legs with femora entirely darkish brown, and tibiae pale brown excepting for a darker brown band occupying the second quarter. Fourth tarsal segments not cordiform, but shorter than fifth. Abdomen blackish; cerci pale brown. Spermathecae two, highly chitinised, oval, sub-equal, about 45 μ by 37 μ, the duct chitinised for some distance, about 7 μ.

Culicoides flumineus sp. n.

A blackish species with numerous macrotrichia on the wings, and rather ill-defined pale areas, the pale spot enveloping the cross-vein small, not reaching the anterior border.

♀. Length of wing, 1·1–1·2 mm., greatest breadth, about 0·5 mm.

Head black. Palpi blackish, third segment inflated distally, with large pit : lengths of last three segments about 22, 8, and 10 units respectively. Antennae very dark brown : segments 4–10 from sub-spherical to oval, measuring in one specimen from 7 by 7 to 8 by 6 units; 11–14 elongate, from 15–17 by 6 units; 15 longer, about 20 units, without stylet. The combined lengths of segments 3–10, 4–10, and 11–15 about 63, 52, and 82 units respectively. *Thorax* blackish, often shining black. Scutellum and postscutellum black the former bearing the usual 3–4 bristles, and a few small hairs. *Wings* broadest near base, rather dark, with a dark patch on the membrane a little beyond end of costa. Macrotrichia numerous, covering greater part of wing, extending almost to base between *M* and *Cu*. Costa extending about two-thirds length of wing. Both radial cells well formed, second not especially large. Pale areas rather ill defined. Pale spot enveloping cross-vein covering only base of first radial cell and not reaching anterior border of the wing. Pale spot just beyond end of the costa, not covering any part of second radial cell. There are traces of other pale spots in the usual situations but these are scarcely perceptible by transmitted light. Halteres brown to blackish, the knobs containing a whitish substance which sometimes shows through. *Legs* with femora and tibiae very dark brown, and tarsal segments somewhat paler. Knees dark. T.R. about 2. Fourth tarsal segments not cordiform, but shorter than fifth. *Abdomen* blackish. Spermathecae two, highly chitinised, oval but tapering to the duct, sub-equal, greatest length about 55–60 μ, and greatest breadth about 40 μ.

Malaya : Pengkalan Kempas, 1936, 43 ♀♀, "banks of shallow river" (*C. H. Williams* and *A. K. Ratnam*).

The wings of this species resemble those of *C. daleki* Smith & Swaminath, and their adornment is similar, but differs in detail, for example in having the pale spot enveloping the cross-vein smaller and not extending to the anterior margin. The insect is moreover blacker, and has two spermathecae of moderate size instead of a single very large one.

Culicoides boophagus sp. n.

A dark brown species with wings devoid of macrotrichia.

♀. Length of wing, about 1 mm., greatest breadth, 0·4–0·5 mm.

Head very dark brown. Eyes contiguous above. Palpi very dark brown, rather short, third segment only slightly inflated, with small pit in anterior third : lengths of last three

segments about 11, 7, and 8 units respectively. Antennae brown, the bases of segments 3–10 paler than rest : 4–10 oval, ranging in one specimen from 8 by 6 to 10 by 5 units; 11–14 more elongate, sub-equal, 12–14 by 4–5 units; 15 longer, about 22 units, without stylet. The combined lengths of segments 3–10, 4–10, and 11–15 about 73, 62, and 74 units respectively. *Thorax* very dark brown. Adornment consisting of large patches and bands, not spots. Scutellum and postscutellum very dark brown, the former bearing the usual 3 bristles, and apparently no small hairs. *Wings* with central areas mainly pale, and with numerous pale spots arranged somewhat as in *C. orientalis*, but with the following notable differences : distal pale spot in *R*5 not so large, and not reaching so nearly to the tip of wing, and *Cu*1 and *Cu*2 bordered with a pale zone on both sides for the greater part of their lengths. There are no macrotrichia, or at most a very few along the extreme periphery near the tip. Both radial cells well formed, distal half of second enveloped by a pale spot. Halteres darkish brown, with whitish knobs. *Legs* with femora and tibiae dark brown, knees and tarsal segments paler, yellowish-brown. Hind legs with femora entirely dark brown excepting at extreme base, and tibiae also dark brown excepting narrowly at both base and apex, where they are yellowish-brown. T.R. about 2. Fourth tarsal segments not cordiform, only slightly shorter than fifth. *Abdomen* very dark brown. Spermathecae two, highly chitinised, oval but somewhat drawn out at proximal ends, sub-equal, total length about 45 μ and greatest breadth about 45 μ. Only the very commencement of the duct is chitinised.

MALAYA : Kuala Lumpur, 1936, 3 ♀♀, " on cattle " (*J. J. Buckley*).

Culicoides buckleyi sp. n.

A small, dark brown species resembling *Culicoides peregrinus* Kieff. and *C. sumatrae* Macfie, but differing as indicated below.

♀. Length of wing, about 0·9 mm.; greatest breadth, about 0·4 mm.

Head very dark brown. Palpi dark brown, third segment only slightly inflated, with shallow pit in anterior third : lengths of last three segments about 13, 9, and 8 units respectively. Antennae darkish brown, torus very dark, and bases of segments 3–10 pale brown : segments 4–10 oval, slightly narrowed anteriorly, measuring in one specimen from 7 by 6 to 9 by 5 units; 11–14 more elongate, sub-equal, about 15–16 by 5 units; 15 longer, about 25 units, without stylet. The combined lengths of segments 3–10, 4–10, and 11–15 about 69, 59, and 88 units respectively. *Thorax* very dark brown, the scutal adornment consisting of patches and broad antero-posterior bands. Scutellum and postscutellum very dark brown, the former bearing the usual 3–4 bristles, and one or two small hairs. *Wings* with adornment generally similar to that in *C. peregrinus* and *C. sumatrae*. The differences most readily appreciated are found in the region of the fork of *Cu*. Here there is no pale spot immediately anterior to the point of bifurcation as there is in *C. sumatrae*; and between the branches of *Cu* there is no pale area in the angle, as there is in *C. peregrinus*, but only a single pale spot which is large, larger than in *C. sumatrae*, and abuts on *Cu*1. Macrotrichia fairly numerous, covering the greater part of the margin of the wing distal to the level of the end of the costa. Halteres brown, with whitish knobs. *Legs* very dark brown. Tibiae of hind legs with a pale zone at both base and apex. T.R. about 2. Fourth tarsal segments not cordiform, but shorter than fifth. *Abdomen* very dark brown, blackish; cerci pale brown. Spermathecae two, highly chitinised, pyriform, sub-equal, total length about 50 μ, and greatest breadth 35 μ.

MALAYA : Kuala Lumpur, 1936, 14 ♀♀, " on cattle " (*J. J. Buckley*).

This insect may be the female of *C. jacobsoni* Macfie, a species found in Sumatra of which only the male is known, but it appears to be much darker in

colour, the wings bear more numerous macrotrichia, and the second radial cell is not so broadly enveloped in a pale spot. These differences may be sexual. A comparison of the genitalia of males from the two localities should settle the question.

Lasiohelea lefanui (Carter).

MALAYA : Kuala Lumpur, 1935 and 1936, 7 ♀♀, " on cattle " (*J. J. Buckley*).

These insects resemble *Lasiohelea lefanui* in almost every respect excepting in the characters of the palps and the T.R. The palps taper a little distally, segment 3 bears only a shallow pit, and the lengths of the last three segments are about 12, 6, and 11 units respectively. The T.R. is only slightly over 2. They are brown or yellowish-brown in colour, not dark brown. Bare areas are present along the veins of the wings. There are no distinct scales. The spermatheca is as in *L. lefanui*.

L. lefanui is a rather variable species, and these insects may be merely a variety of it. This identification should not, however, be assumed to be correct until males have been compared.

Lasiohelea sp.

MALAYA : Kuala Lumpur, 1935, 16 ♀♀, " feeds on cattle " (*J. J. Buckley*).

In these dark brown insects scale-like hairs are present on the legs, but are not conspicuous. The palps have segment 3 somewhat inflated, without a pit, but with a patch of sensory hairs about the middle; 4 and 5 sub-equal, together about the same length as 3, the fifth not attenuated, with a rounded tip. The antennae have the basal segments broader than long, 4–10 in one specimen ranging from 5 by 8 to 8 by 6 units, and the combined lengths of 3–10 and 11–15 about 55 and 87 units respectively. The wings have bare areas along the veins, the costa extending about two-thirds of their length, and the second radial cell long and very narrow. The T.R. is about 2·2 to 2·5. The spermatheca is apparently as in *L. lefanui*, but it is collapsed in both the specimens examined.

They differ from the species which on a previous occasion (1934) I identified as *L. stimulans* (de Meij.), which also has no sensory pit in the palp, in several details, *e.g.* in having the basal segments of the antennae more flattened. They are perhaps more nearly related to *L. nigeriae* I. & M., but as this is a West African species, and as many species of *Lasiohelea* are so closely similar, a comparison of males would be necessary to confirm this.

Lasiohelea lefanui (Carter) var. *squamipes* I. & M.

MALAYA : Selangor, 3.x.1935, 4 ♀♀, " attacks man in bungalow " (*A. G. Pilai*).

These dark brown insects resemble *L. lefanui* (Carter) in almost every respect, but have numerous scale-like hairs on the legs, the T.R. only about 2, and the last segment of the palp attenuated, tapering towards the tip. They are perhaps the variety of this species described on a previous occasion (1924) as *L. lefanui* (Carter) var. *squamipes* Ingram & Macfie.

I have examined similar specimens from two other localities, namely, NEW BRITAIN : Rabaul, 27.iv.1935, 7 ♀♀ (*Dr. T. C. Backhouse*), and SOLOMON IS. : Russell Is., Lingatu, 9.iii.1936, 7 ♀♀, " Biting " (*R. A. Lever*).

The types of all the new species described in this paper are in the British Museum.

A STUDY OF THE GENUS *GRATIDIA* STÅL (PHASMODEA, CLITUMNIDAE)

By Leo Mistshenko.

(*Leningrad.*)

Communicated by Dr. B. P. Uvarov, F.R.E.S.

The present paper is the result of studying the collections brought from Turkmenistan by V. A. Maximov, and the collection of the Zoological Institute of the Academy of Sciences, Leningrad.

It is a special pleasure to acknowledge my indebtedness to Dr. E. F. Miram, curator of Orthoptera at the above-mentioned Institute, for her kind assistance in the work; to Prof. A. P. Semenov-Tianshansky and Dr. Alexander H. Kiritshenko for valuable information; and to V. A. Maximov for kindly placing at my disposal his own interesting collection.

Gratidia bituberculata Redtenbacher.

1889. *Gratidia bituberculata* Redtenbacher. *Wien. ent. Ztg*, **8** : 26–27, no. 2 [types ♀, ♂; Turkmenistan : Krasnovodsk, Ashkabad].

1908. *Gratidia aliena* Brunner von Wattenwyl. *Die Insektenfam. der Phasmiden* : 218, 222 [type ♀; Dzhungaria, river Ili, near Kuldzha] (*syn. nov.*).

The study of the above-mentioned material, including 2 ♀♀ (not ♂ and ♀, as stated by Brunner von Wattenwyl) types of *Gratidia aliena* Br.W., has led me to the conclusion that Brunner von Wattenwyl, when establishing the species *G. aliena*, was dealing with two quite different species. As the author has indicated the locality (" ad flumen Ili in occidente oppidi Kultscha in Dschungaria ") only for one of the females (the male, according to Brunner von Wattenwyl) investigated by him, this specimen must be regarded as the type.

A comparative study of this type specimen and of the specimens of *G. bituberculata* Redt. from Turkmenistan (Ashkabad, Kara-Kala) has shown their complete identity. The only difference between them is the difference in the size of the body, a character which is liable to considerable variation, and cannot serve even for establishing a geographic subspecies (in the collection of the Zoological Institute there is a large series of *G. bituberculata* from various parts of the Soviet Union; in this series, collected in diverse geographic regions, the variation in the size of the body is rather marked).

As regards the other female, belonging to a quite different species, it remains without name. It is described below under the name of *Gratidia uvaroviana* sp. n.

Gratidia uvaroviana sp. n.

1908. *Gratidia aliena* Brunner von Wattenwyl. *Die Insektenfam. der Phasmiden* : 221, 222 (partim).

♀ (holotype). Body medium, with distinct tubercles.

Head elongate, finely punctured, nearly smooth; median keel very slight. Occiput depressed, with a slight median keel. Eyes round. Antennae thick, short, 12-segmented, nearly reaching the anterior margin of the pronotum.

Pronotum anteriorly constricted, nearly square, with a distinct longitudinal depression at the middle; lateral margins strongly undulated; surface finely and densely punctured,

with indistinct tubercles. Mesonotum longer at the middle, somewhat constricted. Metanotum a little shorter than the mesonotum, also somewhat constricted in the middle. Mesonotum and metanotum with a very distinct median keel and with two longitudinal rows of very marked obtuse tubercles. Sternum finely and densely punctured.

Abdomen seen from above, finely punctured; the first five tergites with two longitudinal rows of very distinct obtuse tubercles. Apex of the subgenital plate triangular.

General coloration pale-brownish. Femora dirty-whitish, with three brownish fasciae.

Male unknown.

	Holotype ♀.	Paratype ♀.
Length of the body . . .	46.9 mm.	47·5 mm.
,, of the antennae . . .	4·1 ,,	3·9 ,,
,, of the pronotum . . .	2·8 ,,	2·0 ,,
,, of the mesonotum . .	9·3 ,,	8·6 ,,
,, of the metanotum . .	7·9 ,,	7·5 ,,
,, of the anterior femora . .	17·9 ,,	15·5 ,,
,, of the middle femora . .	11·2 ,,	10·0 ,,
,, of the posterior femora .	15·1 ,,	13·0 ,,

Localities.—Turkmenistan: V. Keltetshinar, 16.viii.1928, 1 ♀ (holotype) (*Maximov*).

Iran: Khorasan, Hassan-Khurda, 24.iv.1858, 1 ♀ (*Kaizerling* and *Binert*).

This species is near to *Gratidia spinulosa* Brunner von Wattenwyl (Brunner von Wattenwyl, K. und Redtenbacher, J., 1908, *Die Insektenfamilie der Phasmiden*: 220, 228), described by that author from S.E. Iran (sett. Karvandar, Bampur), but differs from it by the following characters:

Gratidia uvaroviana sp. n.

♀. Pronotum square.

Tubercles covering the whole of the meso- and metanotum, small, obtuse.

First five tergites of the abdomen above with two rows of small, distinct tubercles; remaining abdominal tergites smooth.

Gratidia spinulosa Br.W.

♀. Pronotum rectangular.

Tubercles only in the anterior part of the meso- and metanotum, larger, acute.

All tergites of the abdomen above smooth, without tubercles.

This species is dedicated to Dr. B. P. Uvarov, the author of many interesting works on the Orthoptera.

The holotype and paratype of this species are preserved at the Zoological Institute of the Academy of Sciences, Leningrad.

Book Notice.

Faune de France. 31. *Homoptères Auchénorhynques.* I. By H. Ribaut. P. Lechevalier. 8vo. Paris, 1936. pp. 232, 629 figs. 60 francs.

This work commences with an introductory chapter showing the systematic position and describing the external morphology of Auchenorhynchous Homoptera. Some information is also given on their parasites and on methods of collecting and preserving specimens.

The main part of the book is essentially systematic in treatment and includes many keys to assist in the identification of species. This identification should be assisted by the many text-figures.

A large number of new species and varieties is described for the first time in the book.